# EFFECTIVENESS OF ICE PACK APPLICATION PRIOR TO CHEST TUBE REMOVAL ON PAIN AMONG POST OPERATIVE CLIENTS AT SELECTED SETTING, CHENNAI, 2011.

DISSERTATION SUBMITTED TO

**THE TAMIL NADU DR.M.G.R.MEDICAL UNIVERSITY**

**CHENNAI.**

IN PARTIAL FULFILMENT OF REQUIREMENT FOR THE DEGREE OF

**MASTER OF SCIENCE IN NURSING**

**APRIL 2012**

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# ABSTRACT

A study to assess the effectiveness of Ice pack application prior to chest tube removal on pain among post operative clients at selected setting, Chennai.

## INTRODUCTION

The burden of cardiovascular diseases is increasing globally. India is becoming the capital of cardiovascular diseases. Cardiac surgery is on the rise, whether through disease, congenital defects or generalized degradation of cardiological function, over time cardiovascular diseases are increasing dramatically, substantiating the need for continued growth of cardiovascular surgery. Acute pain is common after cardiac surgery. Pain can significantly interfere with the persons quality of life and general functioning. Chest tubes are inserted after cardiac surgery to drain fluid and air from the chest cavity. Pain during chest tube removal is been poorly managed and has been described as one of the worst intensive care experience for the patients. Management of pain is a high priority for nursing care and the use of simple interventions like icepack application during chest tube removal can reduce the intensity of the pain and make the painful procedure less distressing for the patients.

### Objective

To assess the effectiveness of ice pack application by comparing the level of pain during chest tube removal among the study and control group.

## METHODOLOGY

True experimental post test only design.

**Setting**

The study was conducted at post operative cardiac ICU of Southern Railway Headquarters Hospital, Perambur, Chennai.

**Participants**

60 adult patients who fulfilled the sample selection criteria were selected as samples, 30 each in study and control group.

**Intervention**

**Study group:** Ice pack application around the chest tube insertion site was given to the patients for 15 minutes prior to chest tube removal along with hospital routine ( Inj.Fentanyl 50 mics, ten minutes prior to the chest tube removal).

**Control group:** Patients followed the normal hospital routine during chest tube removal (Inj Fentanyl 50 mics ten minutes prior to the chest tube removal).

## Measurements

Level of pain was assessed objectively and subjectively using combined numeric pain rating scale and modified comfort scale during and within 5-10 minutes after chest tube removal. Descriptive and inferential statistics were used to analyse the data.

## RESULTS

The findings of the study revealed that the mean differed score on the level of pain in the study group was 15.47 with a standard deviation of 2.74 and for the control group the mean differed score was 22.03 with a standard deviation of 3.54 and the calculated t value was 8.039 which showed the effectiveness of icepack application in reduction of pain at a high statistical significance of $p<0.001$.

## DISCUSSION

Ice pack can be used as an effective non pharmacological intervention in reducing pain during chest tube removal. Thus, making the painful procedure less complicated and less distressing for the patients.

## Implications

The study results support the effectiveness of non pharmacological intervention like icepack along with the hospital routine in reduction of pain during chest tube removal and heightens the need for effective post operative pain management among nurses working in Intensive Care Unit.

Knowledge of non pharmacological interventions which are cost effective and easily available is essential for the clinical nurses to alleviate pain and promote comfort for the patients. Nursing education should offer short term continuing nursing education programme on integration of pharmacological and non pharmacological interventions in reducing pain and decreasing the need for narcotic analgesics.

Clinical nurses should be encouraged and motivated to apply the research findings in their daily nursing care and to bring out new innovative interventions to prevent suffering and promote comfort for the patients.

# CHAPTER – I

# INTRODUCTION

## BACKGROUND OF THE STUDY

Cardiovascular diseases are the world's largest killers, claiming 17.1 million lives a year. Cardiovascular disease include diseases of the heart and the blood vessel system especially the veins and arteries leading to and from the heart.**(Braunwald 2009)[10].**

Cardiovascular disease accounts for about 29 per cent of all deaths globally each year. Worldwide 32 million deaths, are due to non communicable diseases and 2 million deaths are due to cardiovascular diseases. In developed countries Cardiovascular disease and stroke are the 1st and 2nd leading cause of death respectively. **(World Health Organisation,WHO, 2009)[106].**

Coronary artery disease (CAD) is on the rise by 1,200,000 per year, 100,000 per month, 23,076 per week, 3,287 per day, 136 per hour, 2 per minute in the USA. **(American Heart Association, AHA 2006)[109].**

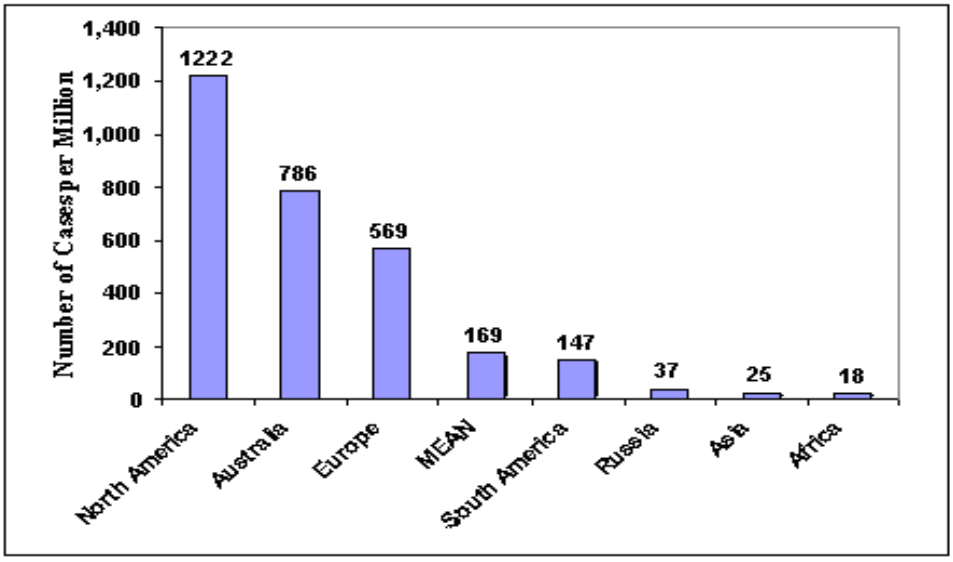
Every year 4 Indians die of heart ailment every minute. The rate of heart diseases in India has doubled over the past 20 years. In India the prevalence rate of CAD was found to be 65.4 and 47.8 per 1000 males and females respectively. In Haryana the prevalence rate was 22.8 and 17.3 per 1000 males and females respectively. The peak period was attained between 51 – 60 years and males were affected more than females. Rheumatic heart disease is a common form of heart disease and the main cause of death among children and young adults in India. It was estimated that over 6 million children and young adults were affected by this disease. The spatial distribution of heart diseases in Trichirappalli district observed for 2004 -2005 data explained that the highest number of cases were in Trichirappalli city region.

**Table-1 Prevalence of Rheumatic Heart Disease (RHD), World Health Report (2006)[106].**

| RHD | PREVALENCE /1000 |
|---|---|
| ASIA | 0.4 – 21.0 |
| SOUTH AMERICA | 1.0 – 17.0 |
| AFRICA | 0.3 – 15.0 |
| USA | 0.6 |
| INDIA | 6 - 11 |

Over the last 50 years India has made considerable advances in the field of cardiac treatment, but this has not decreased the number of heart patients. Cardiac surgery is on the rise globally, whether through disease, congenital defects or generalized degradation of cardiological function. Over time the cardiovascular diseases are increasing dramatically, substantiating the need for continued growth of cardiovascular surgery. Ageing populations, increased obesity, poor nutrition and other heart-health stressor factors like smoking, alcohol, stress are increasing the cardiovascular disease rate.

**Figure.No.1 Discrepancy by region on the number of heart surgeries performed per million population in World level, WORLD HEART FEDERATION 2009.**



Globally 8% of the world population have access to Coronary Artery Bypass Graft surgery(CABG), 6.5 lakhs surgeries were done in the year 2007. Out of 6.5 lakhs, 4.5 lakhs were performed in the US alone, 2 lakhs were performed in the rest of the world**.**

In the year 2010, there were about 30,000 bypass surgeries done in the United Kingdom. An estimated 6.2 million in patient cardio-vascular operations and procedures were performed in the United Kingdom. Each year 694,000 open heart procedures were carried out which includes 104,000 valve replacement surgeries, 2,210 heart transplants and 4,48,000 CABG surgeries among which 323,000 were men and 1,25,000 were women .

In India 50,000 - 60,000 cardio thoracic operations are performed every year, from 2000 - 2010 about 1020 patients aged 65 underwent Isolated Aortic Valve Replacement, 820 patients underwent Minimally Invasive Direct Access Heart Valve Surgery and 252 patients underwent Mitral Valve Replacement.

Cardiac surgery presents a life saving and life enhancing opportunity to hundreds of thousands of patients. Many patients face significant challenges during the post operative period including pain, anxiety and tension which can impair immune function and slow wound healing. **(Wong .A.T. 2010)[101].**

Acute pain is common after cardiac surgery. Pain can significantly interfere with the persons quality of life and general functioning. Surgical pain is a major stressor and will evoke not only local but general responses also. Pain following surgery can result in adverse physiological responses including the micro circulation which can further compromise oxygen delivery during the post- operative period. Failure to relieve post operative pain

increases the risk of post operative complications and further contributes to the surgical stress response. **(Kavang et al 1994)[70].**

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage. It is initiated by the stimulation of the nociceptors in the peripheral nervous system or malfunction of the peripheral or central nervous system. Most pain resolves promptly once the painful stimulus are removed and the body has healed. Pain produces tension which may stimulate the central nervous system to release adrenaline which results in the constriction of arterioles and increased heart rate, which further leads to increased afterload and thus decrease the cardiac output.

Chest tubes are inserted after cardiac surgery to ensure that fluid and air drain from the chest cavity to reduce severe cardiac and respiratory complications related to abnormal accumulation of air and fluids. Keeping chest tubes in place is associated with increased pain, discomfort, mechanical irritation of the heart and pericardium and increased risk of infection.

In the early post operative period presence of chest drains adds to the patients discomfort often resulting in severe deep visceral pain restricting the mobility of the patient. Drains are removed when drainage is minimal after cardiac surgery (<10 – 20 ml / hr). Removal of chest drains is extremely painful and based on individual patient assessment an appropriate analgesic should be administered. **( Parkin, 2002)[85].**

A Combination of pharmacological and non pharmacological methods of pain control yield the most effective pain relief for the patient. Non pharmacological interventions are useful and have the potential to further modulate nociceptor activity particularly in the dorsal horn of the spinal cord.

Various interventions include music therapy, reflexology, application of cold, ice pack, acupressure, back massage and so on. **(Mc Cuffre 2005)[78].**

Ice is applied to the body for both systemic and local effects. Ice application slows the suppurative process and the absorption of tissue fluids, it restricts the movement of blood and the tissue fluids thus it relieves pain caused by increased amount of fluid moving into the tissues. It decreases the rate of tissue metabolism and thus decreases the demand upon the heart for food and oxygen. The use of cold application during and after a painful procedure such as chest tube removal decreases nerve conduction velocity and pain intensity and hence must be considered as a pain relieving measure.

## NEED FOR THE STUDY

Chest drains are inserted in a wide range of situations, such as after cardiothoracic surgery, trauma, post operative complications and other medical conditions to drain pus, air or fluid from the lungs. These chest tubes are typically removed 24 -48 hrs after surgery or when the excess air, blood or fluid has been properly drained.

When the chest tube remains in place the endothelium that lines the chest cavity adheres to the tube, when the tube is removed, the pulling force may shear those adhesions and cause pain during removal which can be a painful and a frightening experience for the patients. Care should be taken to make the procedure occur with little pain and distress as possible. The removal of chest tubes has been described as one of the worst experiences in the Intensive Care Unit for the patients. Patients described chest tube removal as a painful event in the post operative recuperation and reported that the pain from the procedure was poorly managed. **( Bruce et al , 2006)[46] .**

The management of pain is a high priority for nursing care as pain is the fifth vital sign. The Joint commission for Accreditation of Health Care

Organisation Standards (2008) indicated that the relief of pain is a human right that includes the expression of pain, appropriate assessment and management of pain. The non pharmacologic approach to pain management includes a wide variety of techniques that not only addresses the physical sensations of pain, but also prevent suffering by enhancing the psycho emotional and spiritual components of care. The various non pharmacologic methods include music therapy, light therapy, acupuncture, pranic healing, guided imagery, reflexology, heat and cold application .

The use of cold application could be a potential solution for reducing pain associated with chest tube removal. The analgesic effects of application of cold can be explained by Melzack and Wall in "Gate control theory". According to the Gate control theory the stimulus of the chest tube removal activates fibres within the parietal pleura, chest muscles and chest tube insertion site leading to the release of various excitatory neurotransmitters. Application of cold can also lead to the reduction or reversal of pain impulses by activating the descending inhibitory neurons thereby blocking the ascending nerve impulses which closes the "Gate" and the brain will not interpret the impulse as painful.

A true experimental study was done to assess the effectiveness of ice as an intervention for pain intensity, pain distress and pain quality experience among 700 post cardiothoracic patients undergoing chest tube removal. The experimental group received ice, the control group received a placebo. The results of the findings revealed that pain intensity decreased in both groups after the ice and placebo intervention which suggests a placebo effect. **(Jenny Sauls, 2002)[92].**

In the Southern Railway Headquarters Hospital Perambur, everyday 4-5 patients undergo open heart surgery with the placement of two- three chest tubes. During the investigators clinical postings and also from her personal experience of working in the coronary care unit and cardiac Intensive Care Unit, She

observed several patients verbalise that the pain during chest tube removal was not effectively controlled inspite of analgesics. Hence, the investigator felt the need for effective pain management during chest tube removal as a part of nursing care. As the investigator is specializing in the field of cardiothoracic and vascular nursing and inspired by review of several studies, she was motivated to conduct the study on effectiveness of ice pack application on the level of pain during chest tube removal among post operative clients.

## STATEMENT OF THE PROBLEM

A study to assess the effectiveness of ice pack application prior to chest tube removal on pain among post operative clients at selected setting, Chennai.

## OBJECTIVES

1. To assess the post test level of pain in the study and the control group.
2. To compare the post test level of pain between the study and the control group.
3. To associate the post test level of pain with selected demographic variables in the study and the control group.

## OPERATIONAL DEFINITIONS

### Effectiveness

It refers to the changes in the level of pain after ice pack application along with hospital routine (Inj Fentanyl 50 mics administered 10 minutes prior to chest tube removal) assessed using combined numeric pain rating scale and modified comfort scale .

### Ice Pack Application

It refers to the preparation of ice pack by placing ice cubes in a zip lock cover maintained at a temperature of about + 4° Celsius , and wrapping it

with a sterile gauze and placing it around the chest tube site for 15 minutes, prior to chest tube removal.

**Prior to Chest Tube Removal**

It refers to the process of taking out the mediastinal and pleural tubes from the thoracic cavity within 5 minutes after the icepack application by the staff nurses

**Pain**

It refers to the intensity of pain experienced by the patient during chest tube removal which was assessed subjectively and objectively using Combined Numeric Pain Rating Scale and Modified Comfort Scale respectively within 5-10 minutes after the chest tube removal.

**Post operative clients**

It refers to persons who underwent cardiothoracic surgeries like coronary artery bypass graft, valve replacement surgeries, any other open heart surgeries with chest tubes insitu.

## ASSUMPTIONS

1. The post operative clients may experience excruciating pain during chest tube removal.
2. Application of ice pack around the tube for 15 minutes prior to chest tube removal may minimize the pain.

## NULL HYPOTHESES

**$NH_1$-** There is no significant difference in post test level of pain between the study and the control group.

**$NH_2$-** There is no significant association of the level of pain with selected demographic variables in the study and control group.

## DELIMITATION

The study was delimited to a period of 4 weeks.

## CONCEPTUAL FRAMEWORK

Based on Wiedenbachs Helping Art of Clinical Nursing Theory.

This section deals with the conceptual framework adopted for the study. A conceptual framework or model provides the investigator the guidelines to proceed in attaining the objectives of the study. Based on the theory, its a schematic representation of the steps, activities and outcome of the study.

The conceptual framework of this study was based on Wiedenbach's helping art of Clinical Nursing Theory. Ernestine Widenbach's views this theory as a set of interrelated concepts that gives systematic view of a phenomenon that is explanatory and predictive in nature. The present study was aimed to help the patient who underwent cardiac surgery to reduce the level of pain during chest tube removal. According to the theorists the practice of nursing comprises a wide variety of services each directed towards the attainment of one of its components.

### STEP 1- IDENTIFYING THE NEED FOR HELP.

In identifying the need, the nurse perceives the patient as consistent or inconsistent, collect the information and identifying the need for help. There are two components in identifying the need for help.

### a) General information

This comprises of collecting the information to identify the need .In this study the investigator assessed the general information which includes the demographic variables such as age, gender, education, occupation, number of chest tubes, type of surgery and duration of removal of chest tubes.

**b)The central purpose**

Central purpose refers to what the nurse wants to accomplish. In this study the investigator identified the central purpose was to reduce the level of pain during chest tube removal among post operative cardiothoracic clients.

**STEP 2 - MINISTERING THE NEED FOR HELP.**

In ministering the needed help to the patients, the nurse may give advice or information, make referral, apply a comfort measure or carry out a therapeutic procedure .

There are two components in identifying the need for help.

**a) Prescription**

It refers to plan of care, the nature of action that will fulfil the central purpose. In this study the investigator adopted the effectiveness of ice pack application in reduction of pain during chest tube removal.

**b) Ministering** ( intervention)

The nurse may give advice or information or carry out therapeutic procedure. In this study the investigator gave therapeutic ice pack application to patients prior to chest tube removal.

**c) Realities**

Realities refer to the physical , emotional and spiritual factors that come into play in a situation. In this study it refers to the patient's tolerance to pain, the number of chest tubes and the duration of removal of chest tubes.

**d) Agent**

The agent is the participating nurse or a designer who has the personal attributes, capabilities, commitment and competence to provide nursing care. In this study the agent is the researcher.

**The Recipient**

The recipient is the patient who has personal attributes, problems, capabilities, aspiration and abilities to cope. In this study the recipient are the patients who underwent cardiothoracic surgery.

**The Goal**

The goal is the nurses desired outcome, it directs action and suggests the reason for taking those actions. In this study the goal was to reduce the pain during chest tube removal.

**The Means**

The means are the activities and devices used by the nurse to achieve the goal. In this study the means was ice pack application around chest tube insertion site.

**The Framework**

Framework refers to the facilities in which nursing is practiced, it comprises of human, environmental, professional and organisational aspects of care. In this study the framework refers to the patients in cardiac post operative ICU at Railway hospital.

**STEP 3 – VALIDATING THE NEEDED HELP WAS MET.**

It is validating the needed help was delivered in achieving the central purpose. This step involves the post assessment after ministering the help and comparison to infer the outcome. This approach thereby enable the researcher to make suitable decision and recommended action to continue, drop or modify the nursing action. Here it is the effectiveness of ice pack application on the level of pain among post operative CardioThoracic clients during chest tube removal using Combined Numeric Pain Rating Scale and Modified Comfort Scale.

**Reassessment** – If there was no reduction in the level of pain after Icepack application the investigator recommended the reassessment.

**Enhancement** – If there was reduction in the level of pain after Icepack application, enhancement of the intervention will be carried out

## OUTLINE OF THE REPORT

**CHAPTER I :** Dealt with the back ground of the study, need for the study, statement of the problem, objectives, operational definitions, null hypotheses, assumptions, delimitations and conceptual frame work.

**CHAPTER II :** Focuses on review of literature related to the present study.

**CHAPTER III :** Enumerates the methodology of the study.

**CHAPTER IV :** Presents the data analysis and data interpretation.

**CHAPTER V :** Deals with the discussion of the study

**CHAPTER VI :** Gives the summary, conclusion, implications, recommendations and limitations of the study.

The study report ends with selected Bibliography and Appendices.

# CHAPTER – II

## REVIEW OF LITERATURE

Review of literature is a systematic search of published work to gain information about a research topic (Polit & Hungler ,2011)[30].

Through the literature review, researcher generates a view about what is known about a particular situation and lays a foundation for the research plan. It provides a background for the current knowledge on the topic and illuminates the significance of the study.

The present literature review was based on extensive surveys of journals, books and International nursing studies, a review of literature relevant to the study was undertaken which helped the investigator to develop deep insight into the problem.

The logical sequence of the chapter is organized in the following sections:

**LITERATURE REVIEW HAS THE FOLLOWING FOUR SECTIONS:**

**Section–A :** Reviews related to pain after Cardio Thoracic surgeries and Chest tube drainage.

**Section–B :** Reviews related to effectiveness of ice in reduction of pain.

**Section–C :** Reviews related to various measures to control pain during chest tube removal.

**Section-D :** Reviews related to effectiveness of ice pack application in reduction of pain during chest tube removal.

**Section–A**: **Reviews related to pain after CardioThoracic surgeries and Chest tube drainage.**

**Miranda Ade.,F. (2011)[81]** conducted a descriptive explorative study to evaluate the pain intensity and vital signs after cardiac surgery among 38 patients

during the postoperative period . The findings of the data, measured before and after performing the nursing procedure, indicated that the manifestation of pain occurred at different levels and the main changes in vital signs were referred to blood pressure. The study concluded that there was a relationship between the pain intensity and the vital signs.

**Arbour.,C., Gelinas (2010)[40]** conducted a descriptive study to evaluate the effectiveness of vital signs as valid indicators for the assessment of pain among 105 postoperative cardiac ICU clients who were observed during three testing periods: (1) unconscious and mechanically ventilated, (2) conscious and mechanically ventilated and (3) after extubation at a cardiology health center in Canada During these testing periods, vital signs were assessed using the ICU monitoring at rest, during a nociceptive procedure and 20 min post-procedure. The findings revealed significant changes in most vital signs but were dependent on the patients' status (mechanically ventilated or not) . The study concluded that vital signs should only be used as a cue when behavioural indicators are no longer available in mechanically ventilated or unconscious patients.

**Aslan., F., et al (2010)[41]** conducted a descriptive study to assess the pain perception after cardiac surgery among 300 adult patients who stayed in cardiac surgery ICU post-operatively for a minimum of 48 hours, had a sternal incision, chest tube, and required mechanical ventilation. The data were collected using face-to-face interviews by the researchers following transfer from the ICU to the surgical ward within 48 hours .The findings revealed that most patients described their pain as aching (n = 177) and throbbing (n = 154). The presence of chest tubes (n = 95), endotracheal tube suctioning (n = 47), change of dressings (n = 27) and the use of air mattresses (n = 20) were identified as painful experiences . The study concluded that cardiac surgery patients verbalized their pain experience with different words and identified different situations that decreased or increased their pain, which shows the subjective and complex nature of pain.

**Cutshall .,S.,M., (2010)**[52] conducted a true experimental study to assess the level of pain, anxiety, tension and satisfaction scores among 58 cardiac surgery patients before after massage therapy for 20 minutes at St Mary's hospital, Minneosta. The findings revealed that there was statistically and clinically significant decrease in pain anxiety and tension scores among the study group. The study concluded that massage therapy may be considered important therapy for inclusion in the management of post operative recovery of cardio vascular surgical patients.

**Marmo.,L.(2010)**[77] conducted a descriptive study to assess the effectiveness of three Pain assessment tools which included Critical-Care Pain Observation Tool (CPOT), adult Nonverbal Pain Scale (NVPS), and the Faces, Legs, Activity, Cry, and Consolability scale (FLACC) among 24 nonverbal critically ill patients in a cardiac post anaesthesia care unit during two painful events like suctioning and repositioning. The findings revealed that both the CPOT and the NVPS demonstrated high reliability (Cronbach alpha coefficients 0.89).The study concluded stating that adequate education and understanding of the use of these scales is critical for accurate assessment and subsequent interventions.

**Mohsen Mohammed (2010)**[82] conducted a prospective study to assess the impact of chest tube removal time following CABG among 307 patients who were randomly assigned to two groups at Isfahan University, Iran. In group 1 chest tubes were removed within 24 hours after surgery whereas in group 2 the chest tubes where removed in the second 24 hours after surgery. Respiratory rate and pain level were assessed. The findings revealed that the pain level evaluated 24 hours post-operation was lower in the first group, and the difference in the pain level between the 2 groups evaluated 30 hours post-operation was significant (P=0.016). The study concluded that early extracting of chest tubes after coronary artery bypass graft surgery when there is no significant

drainage can lead to pain reduction and consuming oxygen which is an effective measure after surgery toward healing.

**Parry.,M (2010)[86]** conducted a descriptive study to assess the pain experience of men and women after CABG. Participants included men(n=78) and women (n=17)who were having first time non emergency CABG surgery. The findings revealed that 47% of the women (n=8) had moderate to severe pain. It was statistically significant between groups with patients reporting moderate to severe pain with movement (p=.03) , walking (p=.01) and sleeping (p=.01).

**Van Gullick (2010)[102]** conducted a prospective two phase study to assess the effectiveness of a pain management programme which consists of the following strategy. All staffs were trained in assessing pain and to assess the pain scores three times a day and the preferred analgesic treatment was optimised among 190 post operative cardiac patients in the ICU. The findings revealed that patients in the intervention group with higher Numeric Rating Scale scores received higher morphine amounts. In control group no such relationship was observed. The study concluded that the intervention programme successfully reduced the occurrence of un acceptable level of pain and recommended that pain management should focus on the prevention of pain.

**Baumgarten.,M.,C (2009)[42]** conducted a cross sectional study to assess the lung function among 70 patients undergoing heart surgery using incentive spirometry. The findings revealed that the pulmonary function was significantly impaired in the post operative compared to the pre operative period ($p<0.01$). The study concluded that the pulmonary function showed a significant relationship with pain.

**Diby.,M., (2008)[54]** conducted a prospective quasi experimental study to assess the effectiveness of post operative pain treatment program in reducing

pain among 133 patients undergoing cardio thoracic surgery which comprises of 3 periods baseline (group baseline), implementation of the algorithm for acute pain management, and reassessment (group reassessment). The effectiveness was assessed using Visual analog scales (VAS) for pain, morphine consumption, pain perception, and sleep quality during their stay in Surgical ICU and after 1 month and 6 months. The findings revealed that the proportion of patients with no pain or often without pain increased from 11% to 37% (P = .005). The number of patients with sleep disturbances decreased from 68% to 35% (P = .012). No differences were observed at 1 and 6 months postoperatively. The study concluded that after algorithm implementation in the SICU, pain intensity at rest decreased and quality of sleep improved.

**Gelinas (2007)**[63] conducted a descriptive study about the pain experience among 93 patients who underwent cardiac surgery using a questionnaire about their pain experience while they were in the ICU. Sixty-one patients (65.6%) recalled being ventilated and 72 patients (77.4%) recalled having pain, the patients (47.3%) identified the thorax as the location of their pain. Pain was mild for 16 patients, moderate for 21, and severe for 25 of them. The study concluded that evidence from research about clinical guidelines for pain management needs to be applied to the care of cardiac surgery patients in order to reduce patient suffering.

**Sendelbach (2006)**[94] conducted an experimental study to assess the effectiveness of music therapy on physiological and psychological outcomes among 86 patients who underwent cardiac surgery, 50 in the experimental and 36 in the control group. The findings revealed a significant reduction in anxiety ($p<0.01$), pain($p<0.01$), systolic BP ($p<0.001$) and heart rate ($p<0.001$). The study concluded stating that patients recovering from cardiac surgery may benefit from music therapy.

**Francine Tinguely (2005)**[99] conducted a prospective study to assess the pain location, distribution and intensity of pain among 200 adult cardiac surgery patients during their post operative hospital stay at Cardiovascular clinic, Switzerland using Numeric pain rating scale, The findings revealed that the maximal pain intensity was significantly higher on the post operative day 1 and lower on the postoperative day 3 and 7. The study results demonstrated that the post operative pain has many facets and pain can be caused by incisions, intraoperative tissue retraction, dissection, multiple intra vascular cannulation and chest tubes left after surgery.

**Brooks.,J.,A(2004)**[44]**,** conducted a descriptive study to assess the level of pain experienced after cardiac surgery among 10 post operative clients. The participants were asked to describe their pain levels for 5 activities expected of patients after cardiac surgery on postoperative days 1 to 6 and changes in pain levels after chest tube removal and extubation. The findings revealed that Pain scores were higher on earlier postoperative days. The study concluded that Pain relief is an important outcome of care. A comprehensive individualized assessment of pain is necessary to promote satisfactory management of pain.

**Roshkovs (2004)**[90] conducted a descriptive study to assess the patients pain perception during epicardial pacing wire(EPW) removal among 100 CABG patients using McGill Pain Questionnaire. The findings revealed that the pain intensity was reported as mild (47%), while the main sensation experienced was pulling (70%). Age, gender, previous cardiac surgery and use of analgesics did not influence the pain and sensations experienced. The study concluded that CABG patients can be prepared for EPW removal by providing information that the procedure is mildly painful.

**Jensen.,L.(2004)**[70]**,** conducted a descriptive study to describe the level of pain among 30 patients undergoing post surgical repair for congenital heart defects, using the McGill Short Form Questionnaire (MSFQ), a visual analogue

pain scale (VAP), and recordings of other variables (analgesic, anxiety, activity level) three times daily until hospital discharge The findings revealed that mean pain intensity scores ranged from 2.44 +/- 1.31 following extubation to 1.30 +/- 0.66 on post-operative day (POD) five. The study concluded that no relationships were found among pain and other demographic, treatment, or clinical variables and pain was reported as mild to moderate intensity, variable in sensations, decreased over time and adequately managed.

**Section–B: Reviews related to effectiveness of ice in reduction of pain.**

**Li fang et al (2011)[57]** conducted a prospective double blinded, quasi experimental study to assess the effectiveness of cryotherapy in reducing the severity of wound pain after arthroscopy, among 59 patients who were assigned to the experimental group (n=33) and the control group(n=26). The experimental group received a three 10-minute sessions of ice packing over a three-hour period, with 50-minute intervals between each session. The findings of the study revealed that the pain score in the experimental group decreased from 5·12–1·82 after cryotherapy, while the pain score in the control group decreased from 4·04–2·88 ($p = 0·047$, 0·012 and 0·005). The study concluded that Cryotherapy with ice in a plastic bag can be applied as a standard protocol for patients who have undergone arthroscopic surgery.

**Yava et al (2011)[108]** conducted an experimental study to evaluate the effectiveness of local cold application in reducing the incidence, severity and pain/sensitivity of skin burns in patients who underwent Trans Thoracic cardioversion(TTC) among 48 patients. The patients were assigned to the study (n=24) and control groups (n=24). Local cold application was performed for a 14 hours period on patients in the study group, whereas only clinical procedures were applied in the control group following TTC. The findings of the study revealed that the incidence of burn and Pain/sensitivity scores was significantly lower in the study group ($p<0.05$). The results suggested that local cold application following

TTC is an effective means of reducing the incidence and severity of burns and pain sensitivity.

**Chailler M et al ( 2010)[49]** conducted a prospective study to assess the effectiveness of cold therapy for the management of pain associated with deep breathing and coughing among 32 post operative cardiac surgery patients. Pain scores from 0 to 10 at rest were compared with pain scores during post deep breathing and coughing with and without the ice gel pack. The findings revealed that repeated measures analysis of variance revealed a significant reduction in pain scores between pre- and post-application of the gel pack ($F = 28.69$, $p < .001$). There were 22 (69%) participants who preferred the application of the gel pack compared with no gel pack. The study outcome showed that cold therapy can be used to manage sternal incisional pain during deep breathing and coughing.

**Saeliw et al (2010)[91]** conducted a prospective randomised single blinded study to assess the effectiveness of ice application on patient comfort before and after botulinum toxin type A injections among Sixty patients who underwent botulinum toxin A treatment. Participants were divided into three groups, In group 1 ice was applied for 5 minutes before the injection, In group 2 ice was applied 5 minutes after the injection, and group 3 served as a control, receiving an injection without ice application. A numeric pain distress scale was used to assess the pain intensity. The ratings indicated that pain was significantly reduced in group 1 compared to group 3 ($p = 0.005$), but there was not a significant difference between groups 1 and 2 ($p = 0.109$) or between groups 2 and 3 ($p = 0.448$). The study concluded that using an ice application 5 minutes before or after injection showed no difference but both significantly reduced pain compared to those without ice application.

**Koc., M et al (2006)[73],** conducted a prospective randomised study to assess the effectiveness of cryotherapy in reduction of post-operative pain following hernia surgery among forty post operative patients. Postoperatively the

intervention consist of chipped ice in a plastic bag, and a plastic bag containing only room temperature water (control) were placed over the incision for 20 min. Postoperative pain data were collected at 2, 6 and 24 h after operation according to validated visual analogue scale (VAS), the highest pain levels were recorded 2 hours postoperatively for both groups. There was significant difference in the VAS scores between the groups at 2, 6 and 24 h. The study findings suggested that local cooling is a safe and effective technique for providing analgesia following inguinal hernia repair.

**George.,K.,P. et al (2004)[61]** conducted an experimental study to assess the effectiveness of cryotherapy on Nerve Conduction Velocity (NCV), pain threshold (PTH) and pain tolerance (PTO) among adult male sport players (n=23). The outcome measures were assessed at two sites served by the tibial nerve: one receiving cryotherapy and one not receiving cryotherapy. The findings of the study revealed that Cryotherapy led to an increased PTH and PTO at both assessment sites ($p<0.05$).The study concluded stating that cryotherapy can increase PTH and PTO at the ankle and this was associated with a significant decrease in NCV. Reduced NCV at the ankle may be a mechanism by which cryotherapy achieves its clinical goals.

**Section–C: Reviews related to various measures to control pain during chest tube removal.**

**Friesner.,S.,A.(2006)[60]** conducted a quasi experimental study to compare the effectiveness of two pain-management strategies, relaxation exercise with opioids and opioids alone during Chest Tube Removal (CTR) among 40 adults who had undergone coronary artery bypass graft surgery using a 10-cm vertical Visual Analog Scale to measure pain at three points, before CTR, immediately after CTR, and 15 minutes after CTR. The findings revealed a significant difference in pain ratings immediately after CTR and 15 minutes after CTR for the group receiving relaxation exercise as an adjunct to opioid analgesics. This study supported the use of a slow deep-breathing relaxation exercise as an

adjunct to the use of opioids for pain management during CTR among cardiac surgery.

**Mueller.,X.,M (2005)**[107] conducted a prospective study to analyse the duration of chest tube drainage on pain intensity and pain distribution among 80 patients after cardiac surgery. The findings revealed that there was less pain in short drainage group on post operative day 2(p=0.047) and less patients without pain on post operative day 3(p=0.01). The study results stated that a policy of early chest ablation limits pain sensation and simplifies nursing care without increasing the need for repeated pleural puncture.

**Broscious, S.,K.,et al (2004)**[45] conducted an experimental study to assess the effectiveness of music as an intervention for pain relief among 156 patients who were assigned to three groups, control , white noise or music during chest tube removal after open heart surgery. The patients rated their pain immediately after chest tube removal and 15 minutes later using the Numeric pain rating scale, Physiological variables were assessed every 5 minutes until 15 minutes after the chest tubes were removed. The findings revealed that self-reported pain intensity, physiological responses, and narcotic intake after chest tube removal did not differ significantly among the 3 groups. The study concluded that most subjects enjoyed listening to the music, and therefore the use of music as an adjuvant to other therapies may be an appropriate nursing intervention.

**Puntillo,J., et al (2004)**[88] conducted an experimental study to tests various pharmacological interventions to alleviate pain during chest tube removal among cardiac surgery patients. Four analgesic interventions were tested in 74 patients in a randomized, double-blinded study. The findings of the study revealed that Pain intensity, pain distress, and sedation levels did not differ significantly among groups, procedural pain intensity (mean 3.26, SD 3.00) and pain distress (mean 2.98, SD 3.18) scores for all were low. Patients remained alert, regardless of which analgesic was administered. The study concluded that if used

correctly, either an opioid (morphine) or a nonsteroidal anti-inflammatory (ketorolac) can substantially reduce pain during chest tube removal without causing adverse sedative effects.

**Houston,. S. ( 2002)**[69] conducted an experimental study to assess the effectiveness of quick relaxation technique(QRT) on pain associated with chest tube removal among 24 primary Aorta-coronary bypass surgical patients at St lords hospital, Texas using visual analog scale immediately following CTR and 30 minutes later. Results indicated that those who received QRT in conjunction with analgesics reported less than half the amount of pain experienced by those who did not receive QRT. The study suggests that for most patients, the combination of analgesics and relaxation exercises is more effective in decreasing pain during CTR than when analgesics are administered without relaxation exercises.

**Section D: Reviews related to effectiveness of ice pack application in reduction of pain during chest tube removal**

**Nurcan Ertug (2011)**[83] conducted an experimental study to assess the effectiveness of cold application on pain due to chest tube removal among 140 patients, 70 in the experimental group and 70 in the control group at a Thoracic Hospital, Turkey. The study group received cold prior to chest tube removal and pain intensity was evaluated in both groups using Visual analog scale. The findings revealed that there was significant difference in pain with cold application between the two groups. The study results proved that cold application is effective in reducing the pain owing to chest tube removal.

**Emine Kol et al (2010)**[56]**,** conducted a randomised single blinded study to evaluate the effectiveness of ice for the control of pain associated with chest tube irritation among 40 patients (20 in the control and 20 in the study group) who underwent Thoracotomy with chest tube placement using Verbal Category Scale and Behavioral Pain Scale methods. The findings revealed that Average pain severity scores were found to be significantly lower in the study group patients

who received cold therapy than in the control group patients ($p < .05$). The analgesic consumption were lower in the study group than in the control group patients ($p < .05$). The study concluded that, the application of ice to the chest tube insertion site reduced pain associated with irritation along with the need for analgesics.

**Yurdanur Demir et al (2010)[53]** conducted a single randomized experimental study to assess the effectiveness of cold application in combination with standard analgesic administration on pain and anxiety during chest tube removal among 90 patients with Body Mass Index less than 30, who where divided into 3 groups cold application group, warm application group, group without application. Pain intensity were measured by using a vertical visual analog scale. The findings revealed that the application of cold is effective in reducing the pain intensity associated with chest tube removal at a statistically significant at a moderate level of pain (6.77 + or – 2.33) after chest tube removal. The study concluded that application of cold packs reduced the intensity of pain during CTR but did not affect anxiety levels or pain quality. The study recommended that cold application, a non pharmacological intervention can be used as a pain relief during chest tube removal.

**Jenny Sauls (2002)[92]** conducted a true experimental study to assess the effectiveness of ice as an intervention for pain intensity , pain distress and pain quality experience among 700 post cardiothoracic patients undergoing chest tube removal. The experimental group received ice, the control group received a placebo. The results of the findings revealed that pain intensity decreased in both groups after the ice and placebo intervention which suggests a placebo effect. The study suggested that using a longer period of ice application with a larger sample size and replication of the study using 3 groups one with ice, one with placebo and one with only customary treatment may yield significant results.

# CHAPTER – III

## RESEARCH METHODOLOGY

This chapter deals with the methodology adopted for the study. It includes the research design, variables, setting, population, sample, criteria for selection of the sample, sample size, sampling technique, development and description of the tool, content validity, pilot study, reliability of the tool, data collection procedure and plan for data analysis.

### RESEARCH DESIGN

The research design used for this study was true experimental post test only design as it has randomization, manipulation and control. Based on **Polit and Hungler (2011)[30] ,** the framework for the study was done as

**A True experimental post test only design**

| | | | |
|---|---|---|---|
| **R** | **Group** | **Intervention X** | **Post Assessment** |
| **A** | **Study group** Simple Random sampling . n=30 | Icepack application with Hospital routine (Inj Fentanyl 50 mics )administered 10 minutes prior to chest tube removal. | Assessment of Post intervention level of pain within 5-10 minutes after the chest tube removal using combined numeric pain rating scale and modified comfort scale. |
| **N** | | | |
| **D** | | | |
| **O** | | | |
| **M** | | | |
| **I** | | | |
| **S** | **Control group** Simple Random sampling.(R) n =30 | Hospital routine, (Inj Fentanyl 50 mics) administered 10 minutes prior to chest tube removal. | Assessment of Post intervention Level of pain within 5-10 minutes after the chest tube removal using combined numeric pain rating scale and modified comfort scale. |
| **A** | | | |
| **T** | | | |
| **I** | | | |
| **O** | | | |
| **N** | | | |

## VARIABLES

### Independent Variable

The independent variable for the present study was Ice Pack Application.

### Dependent Variable

The dependent variable for the present study was the level of pain.

### Extraneous Variable

Age, gender, height, weight, history of previous surgeries, number of chest tubes among post operative patients in the control and study group.

## SETTING OF THE STUDY

The research setting was at Southern Railway Hospital, Chennai. It is a 500 bedded Multi Speciality Hospital. With regard to cardiology it has a 110 bedded cardiothoracic unit which consists of Cath lab, Cardiac OT, Cardiac ICU, Cardiac semi ICU, Cardiac ward and Isolation unit. Patients after the surgery are transferred to the ICU from the OT and after the removal of chest drains the clients are shifted to the Semi-ICU.

## POPULATION

Approximately 80-90 open heart surgeries are performed every month with the placement of 2-3 chest tubes .Mostly chest drains are removed within 24-48 hours after the surgery in the selected setting.

### Target Population

All the post operative patients who underwent cardio thoracic surgeries like Coronary Artery Bypass Graft, Valve Replacement Surgeries and other open heart surgeries with chest tubes insitu in Southern Railway Hospital, Perambur.

**Accessible Population**

All the patients who underwent Cardio Thoracic surgeries like Coronary Artery Bypass Graft, Valve Replacement Surgeries and other open heart surgeries with chest tubes insitu in Southern Railway Hospital, Perambur during the study period. 70 adult patients who underwent Cardio Thoracic Surgeries and those who fulfilled the inclusive criteria at the selected setting during the study period.

## SAMPLE

The post operative patients who fulfilled the inclusive criteria were the samples of the study.

## CRITERIA FOR SELECTION OF SAMPLES

**Inclusive Criteria**

1. Clients above the age of 20 years
2. Extubated clients who were hemodynamically stable.
3. Clients who were available at the time of data collection and are willing to participate.
4. Clients who can understand English, Tamil and Hindi.

**Exclusive Criteria**

1. Clients with BMI more than 30.
2. Clients who had poor tolerance to cold.
3. Clients with peripheral vascular diseases like Raynaud's disease, venous or arterial ulcers.
4. Clients who were uncooperative.
5. Clients with sensory impairment.

## SAMPLE SIZE

Sample Size consisted of 60 post operative patients with chest tubes insitu, 30 in the study group and 30 in the control group.

## SAMPLING TECHNIQUE

The samples were selected by simple random sampling technique using lottery method. The investigator allocated the samples who took chit number 1 to the study group and the samples who took chit number 2 to the control group. Likewise the investigator selected 60 samples, 30 each in the study and control group.

## DEVELOPMENT AND DESCRIPTION OF TOOL

After an extensive review of literature, discussion with the experts and with the investigator's personal and professional experience, a tool for the data collection procedure was developed.

It consists of three sections.

**Section A :** Demographic Variables

**Section B :** Intervention Protocol

**Section C :** Assessment of post test level of pain using Combined Numeric Pain Rating Scale and Modified Comfort Scale.

**Section A:**

It consists of the demographic variables like age of the clients, gender, education, any previous surgeries, type of surgery, number of chest tubes and duration of removal of chest tubes.

**Section B:**

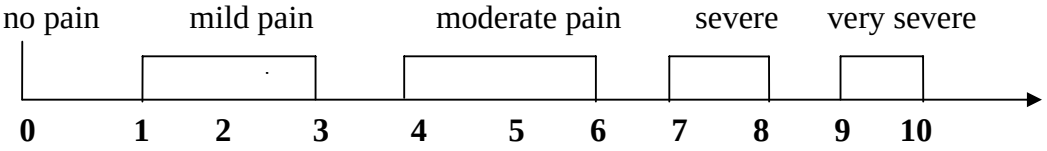
The intervention protocol consists of the Ice Pack Application prepared by the investigator by placing ice cubes in a ziplock cover, wrapped around by a sterile gauze, maintained at a temperature of +4 Celsius and placing it around the chest tube insertion site for 15 minutes.

**Section C:**

Post test level of pain was assessed using combined Numeric Pain Rating Scale and Modified Comfort Scale.

**a) NUMERIC PAIN RATING SCALE**

It is a 10 point rating scale in which the samples are requested to verbalise their subjective level of pain. The ranges include No pain, Mild pain, Moderate pain ,Severe pain and Very severe pain.




**b) MODIFIED COMFORT SCALE**

The Objective assessment of patients level of pain was assessed using Modified comfort scale which has 20 items.

| S.NO. | CONTENT | ITEMS |
|---|---|---|
| 1 | Calmness | 5 |
| 2 | Physical movement | 5 |
| 3 | Blood pressure | 5 |
| 4 | Heart rate | 5 |

**SCORING KEY**

Based on the scores from Combined Numeric Pain Rating Scale and Modified Comfort Scale, an inference was made**:**

| RANGE | INFERENCE |
|---|---|
| ⩽10 | No pain |
| 11-15 | Mild pain |
| 16-20 | Moderate pain |
| 21-25 | Severe pain |
| 26-30 | Very severe pain |

## CONTENT VALIDITY

The content validity of the data collection tool and intervention protocol was ascertained from the expert's opinion in the following field of expertise.

| | | |
|---|---|---|
| Cardio-Thoracic Surgeon | - | 1 |
| Intensivist | - | 1 |
| Nursing experts (Educational set up) | - | 3 |

Modifications were made as per the expert's suggestions and was incorporated in the tool. All the experts had their consensus and then the tool was finalized.

## ETHICAL CONSIDERATION

Ethics is a system of moral values that is concerned with the degree to which the research procedures adhere to the professional, legal and social obligations to the study participants. **Polit and Hungler (2011)[30].**

### 1. BENEFICENCE

The investigator followed the fundamental ethical principle of beneficence (doing good) by adhering to

**a) The right to freedom from harm and discomfort.**

The investigator obtained a No Harm Certificate from the Chief Cardio Thoracic Surgeon of Southern Railway Headquarters Hospital, Perambur, Chennai before proceeding with the main study.

**b) The right to protection from exploitation**

The investigator explained the procedure and nature of the study to the participants and ensured that none of the participants in both the study and control group will be exploited or denied fair treatment.

**2. RESPECT FOR HUMAN DIGNITY**

The investigator followed the second ethical principle with respect for human dignity. It includes the right to self determination and the right to self disclosure.

**a) The Right to Self-determination.**

The investigator gave full freedom to the participants to decide voluntarily whether to participate in the study, to withdraw from the study and the right to ask questions.

**b) The Right to Full Disclosure.**

The researcher has fully described the nature of the study, the person's right to refuse participation and the researcher's responsibilities based on which the informed consent both oral and written consent was obtained from the participants.

**3. JUSTICE**

The researcher adhered to the third ethical principle of justice, it includes participant's right to fair treatment and right to privacy.

**a) Right to Fair Treatment**

The researcher selected the study participants based on the research requirements, no vulnerable or compromised candidates were selected as study participants. The investigator followed the hospital routine for both the study and control group.

**b) Right to Privacy**.

The researcher maintained the participant's privacy throughout the study. The researcher maintained confidentiality of the data provided by the study participants.

## PILOT STUDY

The pilot study was conducted after obtaining ethical committee clearance from the International Center for Collabrative Research (ICCR). A formal written permission was sought from the Principal of Omayal Achi College of Nursing,

the Chief Medical Officer and the Matron incharge of the Cardio thoracic unit of Southern Railway Hospital, Perambur for one week in the month of June.

Every day around 3-4 patients underwent chest tube removal. The investigator selected 10 post operative Cardio Thoracic clients who fulfilled the sample selection criteria, using simple random sampling(lottery) method. The participants who took chit 1 were allocated to the study group (n=5) and those who took chit 2 were allocated to the control group (n=5). The physician ordered Chest tube removal within 24 - 48 hours after surgery based on the level of drain and hemodynamic stability of the clients. A brief explanation was given on the purpose of the study to the participants, oral and written consent was obtained.

Hospital routine analgesics most commonly administered was Inj Fentanyl 50 mics to the patients in the study and the control group, 10 minutes prior to the chest tube removal. For the study group the investigator had carried out the icepack application for 15 minutes prior to the chest tube removal along with the hospital routine and the control group followed the hospital routine only during chest tube removal. Post test level of pain was assessed for both groups within 5-10 minutes after the chest tube removal using Combined Numeric Pain Rating Scale and Modified Comfort Scale. The analysis of the pilot study showed high statistical significance at $p<0.001$. The result of the pilot study gave the evidence that the tool and icepack application was reliable, feasible and practicable to conduct the main study.

## RELIABILITY

The reliability of the tool was established by inter rater method to assess the reliability of the rating scales to assess the level of pain. The reliability score was $r = 0.97$. The “r” value indicated the highly positive correlation.

## PROCEDURE FOR DATA COLLECTION

The main study was conducted after obtaining ethical committee clearance from International Center for Collaborative Research. Formal written permission from the Principal of Omayal Achi College of Nursing, the Chief Medical Officer and the Matron Incharge of the Cardio thoracic unit of Southern Railway Hospital, Chennai, was obtained to proceed with the main study.

60 patients who satisfied the sample selection criteria were selected using simple random sampling (lottery) method. The clients who took chit 1 were allocated to the study group (n=30) and the clients who took chit 2 were allocated to the control group (n=30).

All the patients accepted to participate in the study. A brief self introduction and detailed explanation regarding the purpose of the study was given to the patients. The investigator obtained written informed consent from the participants before proceeding with the study. The physician ordered chest tube removal within 24 - 48 hours after surgery based on the level of drain and hemodynamic stability of the patients.

Hospital routine analgesics most commonly administered was Inj Fentanyl 50 mics to the patients in the study and the control group, 10 minutes prior to the chest tube removal. For the study group the investigator placed the Ice pack wrapped by a sterile gauze and placed it around the chest tube insertion site for 15 minutes. After 15 minutes of ice pack application, the chest tubes were removed within 5 minutes by the staff nurse. The clients vital signs were monitored before the ice pack application and during the chest tube removal by the investigator. The client's level of pain was assessed within 5-10 minutes using combined numeric pain rating scale and modified comfort scale. For the control group the vital signs were monitored before and during the chest tube removal and the patients level of pain was assessed

within 5-10 minutes using combined numeric pain rating scale and modified comfort scale.

## PLAN FOR DATA ANALYSIS

Data collected was analyzed using both descriptive and inferential statistics.

### Descriptive Statistics

1. Frequency and percentage distribution was used to analyze the demographic variable.
2. Mean and Standard Deviation was used to analyze the post intervention level of pain.

### Inferential Statistics

1. Unpaired “t” test was used to compare the effectiveness of ice pack application between the two groups.
2. Chi square test was used to associate the mean improvement level of pain with selected demographic variables.

# CHAPTER – IV

## DATA ANALYSIS AND INTERPRETATION

The analysis is a process of organizing and synthesizing the data in such a way that the research question can be answered and hypotheses are tested **(Polit and Hungler, 2011)[30].**

This chapter deals with analysis and interpretation of the data collected from 60 patients. The data was organized, tabulated and analyzed according to the objectives. The findings based on the descriptive and inferential statistical analysis, are presented under the following sections.

### ORGANISATION OF THE DATA

**Section A :** Description of the demographic variables of the patients in the study and control group.

**Section B :** Assessment of the post test level of pain in the study and control group.

**Section C :** Effectiveness of icepack application on pain during chest tube removal.

**Section D:** Association of the post test level of pain with selected demographic variables in the study and control group.

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**SECTION A: DEMOGRAPHIC PROFILE OF PATIENTS IN THE STUDY AND CONTROL GROUP.**

**Table 2 (a) : Frequency and Percentage distribution of age, gender, education and occupation in the study and control group.**

N=60

| S.No. | Demographic Variables | Study Group | | Control Group | |
|---|---|---|---|---|---|
| 1 | **Age of the client in years** | **No.** | **%** | **No.** | **%** |
| | 20 - 30 | 4 | 13.33 | 1 | 3.33 |
| | 31 - 40 | 3 | 10.00 | 2 | 6.67 |
| | 41 - 50 | 4 | 13.33 | 5 | 16.67 |
| | 51 - 60 | 11 | 36.67 | 14 | 46.67 |
| | 60 and above | 8 | 26.67 | 8 | 26.67 |
| 2 | **Gender** | | | | |
| | Male | 24 | 80.00 | 24 | 80.00 |
| | Female | 6 | 20.00 | 6 | 20.00 |
| 3 | **Education** | | | | |
| | Primary | 0 | 0.00 | 0 | 0.00 |
| | High school | 2 | 6.67 | 2 | 6.67 |
| | Higher secondary | 18 | 60.00 | 22 | 73.33 |
| | Graduate & above | 10 | 33.33 | 6 | 20.00 |
| 4 | **Occupation** | | | | |
| | Unemployed | 3 | 10.00 | 6 | 20.00 |
| | Skilled | 22 | 73.33 | 16 | 53.33 |
| | Unskilled | 4 | 13.33 | 1 | 3.33 |
| | Retired | 1 | 3.33 | 7 | 23.33 |

Table -1 shows the frequency and percentage distribution of age, gender, education and occupation in the study and control group.

With regard to demographic variables, in the study group, majority 11(36.67%) were between the age of 51-60 years, 24(80.00%) were males, 18(73.33%) had higher secondary education and 22(73.33%) were skilled workers.

In the control group, 14(46.67%) were between the age of 51- 60 years, 24(80.00%) were males, 22(73.3%) had higher secondary education and 16(53.33%) were skilled workers.

**Table 2(b): Frequency and Percentage distribution of the postoperative diagnosis, any previous surgeries, number of chest tubes and removal of chest tubes in the study and control group.**

N=60

| S.No. | Demographic Variables | Study Group | | Control Group | |
|---|---|---|---|---|---|
| 5 | **Post operative diagnosis** | **No.** | **%** | **No.** | **%** |
| | CABG | 23 | 76.67 | 22 | 73.33 |
| | Valve replacement surgery | 4 | 13.33 | 6 | 20.00 |
| | Device Closure | 3 | 10.00 | 2 | 6.67 |
| 6 | **Any previous surgeries** | | | | |
| | Minor | 3 | 10.00 | 4 | 13.33 |
| | Major | 2 | 6.67 | 2 | 6.67 |
| | Nil | 25 | 83.33 | 24 | 80.00 |
| 7 | **Number of chest tubes** | | | | |
| | One | 0 | 0.00 | 0 | 0.00 |
| | Two | 25 | 83.33 | 19 | 63.33 |
| | Three | 5 | 16.67 | 11 | 36.67 |
| 8 | **Removal of chest tubes** | | | | |
| | 24 - 36 hours | 25 | 83.33 | 19 | 63.33 |
| | 36 - 48 hours | 5 | 16.67 | 11 | 36.67 |

Table 1(b) represents the frequency and percentage distribution of post operative diagnosis, history of previous surgeries, number of chest tubes and removal of chest tubes.

The above table shows that in the study group, majority 23(76.67%) of the patients underwent CABG, 25(83.33%) had no history of previous surgeries, 25(83.33%) had two chest tubes and 25 (83.33%) had their chest tubes removed within 24-36 hours. In the control group with regard to post operative diagnosis

22(73.33%) underwent CABG, 24(80.00%) had no history of previous surgeries, 19(63.33%) had two chest tubes and 19 (63.33%) had their chest tubes removed within 24- 36 hours.

The investigator was unable to maintain homogenousity for the selected demographic variables like post operative diagnosis, history of any previous surgeries, number of chest tubes and duration of removal of chest tubes due to limited number of samples and most of the patients had their chest tubes removed within 24 -36 hours.

**SECTION B: ASSESSMENT OF POST TEST LEVEL OF PAIN IN THE STUDY GROUP AND THE CONTROL GROUP.**

N=60

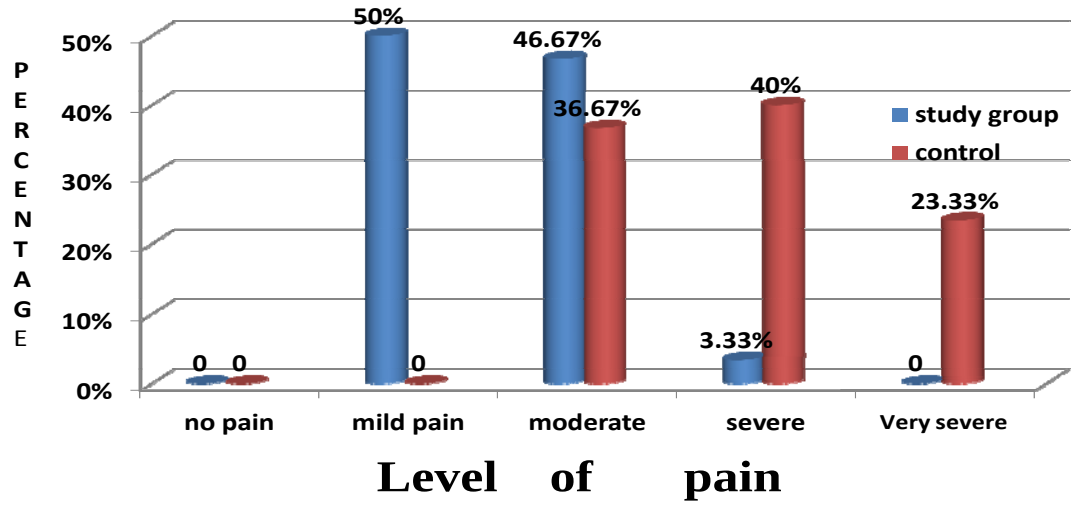


**Figure 3: Post test level of pain in the study and the control group.**

Fig.3 depicts the post test level of pain in the study and the control group.

With regard to the level of pain in the study group 15(50.0%) had mild pain, 14(46.67%) had moderate pain, 1(3.33% had severe pain) but none of patients had experienced no pain. In the control group 11(36.67%) had moderate pain, 12(40.0%) had severe pain and 7 (23.33%) had very severe pain, none of the patients had experienced no pain or mild pain.

It is evident from the above data that the chest tube removal is a painful procedure as none of the patients in both the groups had experienced no pain inspite of analgesic administration.

The subjective pain score correlated with the patients objective pain score.

**Table 3(a): Correlation between subjective pain score and objective pain score in the study group.**

n=30

| Pain | Mean | S.D | 'r' value |
|---|---|---|---|
| Subjective | 5.20 | 0.92 | r = 0.558** |
| Objective | 10.40 | 2.04 | p = 0.001, (S) |

**p<0.01, S – Significant

Table – 3(a) shows the correlation between the subjective and objective pain score in the study group. In the study group the mean subjective pain score was 5.20 with a standard deviation of 0.92 and the mean objective pain score was 10.40 with a standard deviation of 2.04, which revealed a moderate statistical significance at the level of p<0.01.

It is evident from the above table that there is a significant correlation between the subjective and objective pain score in the study group.

**Table 3(b): Correlation between subjective pain score and objective pain score in the control group.**

n=30

| Pain | Mean | S.D | 'r' value |
|---|---|---|---|
| Subjective | 6.90 | 1.15 | r = 0.514** |
| Objective | 14.93 | 2.71 | p = 0.004, (S) |

**p<0.01, S – Significant

Table -3(b) shows the correlation between the subjective and objective pain score in the control group. In the control group the mean subjective pain score was 6.90 with a standard deviation of 1.15 and the mean objective pain score was 14.93 with a standard deviation of 2.71, which revealed a moderate statistical significance at the level of p<0.01.

It is evident from the above table that there was a significant correlation between the subjective and objective pain score in the control group.

**SECTION C: ASSESSMENT OF EFFECTIVENESS OF ICE PACK APPLICATION IN REDUCTION OF PAIN DURING CHEST TUBE REMOVAL.**

**Table 4 : Comparison of the post test level of pain between the study and the control group.**

N=60

| Pain | Mean | S.D | Unpaired 't' value |
|---|---|---|---|
| Study Group | 15.47 | 2.74 | t = 8.039*** |
| Control Group | 22.03 | 3.54 | p = 0.000, (S) |

***p<0.001, S – Significant

Table 4 projects the Comparison of Post intervention level of pain between the study and the control group.

In the study group the mean value 15.47 and Standard Deviation 2.74 when computed with mean value 22.03 and standard deviation 3.54 of the control group revealed that the calculated "t" value 8.039 was greater than the table value. Hence this showed that there was a high statistical significant difference in the level of pain between the study and the control group at p<0.001 level of significance.

The ice pack application proved to be effective in reducing pain during chest tube removal.

**SECTION D: ASSOCIATION OF LEVEL OF PAIN WITH SELECTED DEMOGRAPHIC VARIABLES IN THE STUDY AND CONTROL GROUP.**

**Table - 5 : Association of the level of pain with selected demographic variables in the study group.**

n=30

| S. No. | Demographic Variables | No pain | | Mild | | Moderate | | Severe | | Very severe | | Chi-Square Value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | Any previous surgeries | No. | % | No. | % | No. | % | No. | % | No. | % | $\chi^2 = 12.815$ d.f = 4 p = 0.012 S* |
| | Minor | 0 | 0 | 2 | 6.7 | 0 | 0 | 1 | 3.3 | 0 | 0 | |
| | Major | 0 | 0 | 0 | 0 | 2 | 6.7 | 0 | 0 | 0 | 0 | |
| | Nil | 0 | 0 | 13 | 43.3 | 12 | 40.0 | 0 | 0 | 0 | 0 | |

*p<0.05, S – Significant

Table - 5 represents the association of the level of pain with selected demographic variables like age, gender, education, occupation, post operative diagnosis, any previous surgeries**,** number of chest tubes and duration of removal of chest tubes in the study and control group.

It is observed from the above table that there is low statistical significant association in the level of pain with the demographic variable, history of any previous surgeries at p<0.05 level and there is no significant association in the level of pain with other demographic variables in the study group.

**Patients with previous history of surgery responded well to the ice pack application because of better pain tolerance and awareness about the post operative management.**

In the control group there is no significant association in the level of pain with demographic variables like age, gender, education, occupation, post operative diagnosis, any previous surgeries**,** number of chest tubes and duration of removal of chest tubes.

# CHAPTER – V

## DISCUSSION

This chapter deals with the detailed discussion on the findings of the study interpreted for statistical analysis. The findings are discussed in relation to the objectives, need for the study, related literature and conceptual framework. It is presented in line with the objectives of the study.

**The first objective was to assess the post test level of pain in the study and the control group**.

The statistical analysis showed that in the study group 15(50.0%) patients experienced mild pain, 14(46.67%) experienced moderate pain and 1(3.33%) experienced severe pain and none of the patients had experienced no pain and very severe pain. In the control group 11(36.67%) had moderate pain, 12(40.0%) had severe pain and 7 (23.33%) had very severe pain, none of the patients had experienced no pain or mild pain.

These findings are consistent with the study conducted by **Nurcan Ertug (2011)**[83] to assess the effectiveness of cold application on pain during chest tube removal among 140 patients, 70 in the experimental group and 70 in the control group at a Thoracic Hospital, Turkey. The findings revealed that there was significant difference in pain with cold application between the two groups

**The second objective was to compare the post test level of pain between the study and the control group**

The effectiveness of ice application was assessed by comparing the study and control group by using unpaired “t” test and the calculated t value was 8.039.This showed that there was a high statistical significant difference in the post level of pain between the study and the control group at $p<0.001$ level of

significance. Therefore, the hypothesis $NH_1$ which was stated earlier that "There is no significant difference in the level of pain between the study and control group at $p<0.001$" was rejected.

In the study group the mean subjective pain score was 5.20 with a standard deviation of 0.92 and the mean objective pain score was 10.40 with the standard deviation of 2.04 which showed significance at the level of $p<0.01$. In the control group the mean subjective pain score was 6.90 with a standard deviation of 1.15 and the mean objective pain score was 14.93 with the standard deviation of 2.71 which showed significance at the level of $p<0.01$. The subjective pain score correlated with the patients objective pain score.

The finding are significant with the study conducted by **Yardanur Demir (2010)[53]** to assess the effectiveness of cold application in combination with standard analgesics on pain during chest tube removal among 90 patients with Body Mass Index less than 30.The findings revealed that the application of cold packs reduced the intensity of pain during chest tube removal.

**The third objective was to associate the post intervention level of pain with selected demographic variables in the study and the control group.**

The level of pain was associated with selected demographic variables in the study and control group such as age, sex, education, occupation, postoperative diagnosis, any past surgeries, number of chest tubes and duration of removal of chest tubes by using Chi-square test. The association of the level of pain with selected demographic variables revealed that there was a statistically low significant association in the study group with regard to history of any previous surgeries at $p<0.05$ level.

Hence the hypothesis $NH_2$ which was stated earlier that "There is no significant association on the level of pain with selected demographic variables in the study and control group at $p<0.05$" was rejected for the demographic variable,

history of any previous surgeries in the study group and accepted in the control group. The Null hypothesis was accepted for all the other demographic variables like age, sex, education, post operative diagnosis, number of chest tubes and duration of removal of chest tubes in the study and control group.

# CHAPTER VI

## SUMMARY, CONCLUSION, IMPLICATIONS, RECOMMENDATIONS AND LIMITATIONS.

This chapter deals with summary, conclusion, implications, recommendations and limitations.

### SUMMARY

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage. Acute pain is common after cardiac surgery. Pain can significantly interfere with the persons quality of life and general functioning. Pain during chest tube removal after cardiac surgery is poorly controlled despite analgesics, the therapeutic effects of ice decreases the nerve conduction velocity and pain intensity. Hence the investigator undertook the present study to assess the effectiveness of ice pack application prior to chest tube removal on pain among post operative clients at selected setting , Chennai.

**The objectives of the study were**

1. To assess the post test level of pain in the study and the control group.
2. To compare the post test level of pain between the study and the control group.
3. To associate the post test level of pain with selected demographic variables in the study and the control group.

**The study was based on the assumptions that**

1. The post operative clients may experience excruciating pain during chest tube removal.

2. Application of ice pack around the tube for 15 minutes prior to chest tube removal may minimize the pain.

**The Null hypotheses formulated were**

**$NH_1$-** There was no significant difference in post test level of pain between the study and the control group.

**$NH_2$-** There was no significant association of the level of pain with selected demographic variables in the study and control group.

The broad review of related literature, professional experience and experts guidance which provides the strong foundation for the study including the basis for the conceptual framework and formation of the tool.

**The review of literature related to**

1. pain after Cardio Thoracic surgeries and Chest tube drainage.
2. effectiveness of ice in reduction of pain
3. various measures to control pain during chest tube removal.
4. effectiveness of ice pack application in reduction of pain during chest tube removal.

The conceptual framework for this study was developed based on Wiedenbach's Helping Art of Clinical Nursing Theory, which provided the comprehensive framework for evaluating the effectiveness of ice pack application.

The research design used in this study was true experimental post test only design and it was conducted in the post operative cardiac ICU of Southern Railway Headquarters Hospital, Perambur, Chennai.

The content validity of the tool was obtained from 5 experts and reliability of the tool was done by inter-rater method. The pilot and main study was

conducted in the post operative cardiac ICU of the Southern Railway Headquarters Hospital, Perambur, Chennai.

For the main study 60 samples were selected by using simple random sampling technique using lottery method in that 30 each was allotted to the study and control group.

The data collected was analysed using descriptive and inferential statistics. The overall statistical analysis in the study group revealed that 15(50.0%) had mild pain, 14(46.67%) had moderate pain, 1(3.33%) had severe pain during chest tube removal. None of the patients had experienced no pain or very severe pain. The mean score of post test level of pain in the study group was 15.47 with a standard deviation of 2.74

The overall statistical analysis in the control group showed that 11(36.67%) had moderate pain, 12(40.0%) had severe pain and 7 (23.33%) had very severe pain, none of the patients had experienced no pain or mild pain. The mean score of post test level of pain in the control group was 22.03 with a standard deviation of 3.54.

The results revealed that there was a high statistical significant difference in the level of pain between the study and control group at $p<0.001$ level of significance with a " t" value of 8.039.

Thus, the findings depicted that there was a significant difference i.e. reduction in level of pain after ice pack application prior to chest tube removal among post operative cardiac clients in the study and control group.

## CONCLUSION

The present study assessed the effectiveness of ice pack application on the level of pain prior to chest tube removal among post operative clients at selected

setting, Chennai. The findings revealed that ice pack application was very effective in pain reduction during chest tube removal. Thus it can be used as a non pharmacological measure to control pain during chest tube removal.

Hence the investigator concludes that the ice application can be used as a non pharmacological intervention as it provides a safe and effective reduction in pain without side effects. In this study ice pack application along with hospital routine analgesics (Inj Fentanyl 50 mics) for 10 minutes prior to chest tube removal reduced the intensity and unpleasantness of pain associated with chest tube removal.

## IMPLICATIONS

### Nursing Practice

Pain is the fifth vital sign and the management of pain is a high priority for nursing care. The ICU nurses have a vital role in assessing the post operative level of pain and plan appropriate pharmacological and non pharmacological interventions to relieve pain and prevent post operative complications.

This can be facilitated by motivating the nurses to understand the significance of non pharmacological interventions like ice application which are inexpensive and easily available to minimize the pain intensity and pain distress in post operative patients and also encourage the staff nurses to follow the intervention protocol during chest tube removal.

### Nursing Education

Nurse educators can educate the students about the pain mechanism, assessment methods and various pharmacological and non pharmacological interventions to relieve pain and ensure that the students learn about the significance of post operative pain management, prevention of post operative complications due to pain and the side effects of analgesic medications.

Nurse educator can arrange and conduct workshops, conferences and seminars on pain management and highlight the effectiveness of simple, inexpensive and easily available interventions like icepack application in reduction of pain during painful procedures like chest tube removal. The nurse educator can encourage the students for effective utilization of research based practice in reducing pain which will help to minimize the requirement of narcotic analgesics.

**Nursing Administration**

Nurse administrator can collaborate with governing bodies in formulating policies to employ specially qualified nurses in post operative pain management in ICU. The nurse administrator should formulate protocols, policies, guidelines and system of care given by nurses during procedures like chest tube removal. Nurse administrator ensures the implementation of nursing interventions which are research based and clinically effective in promoting the comfort of the patient.

**Nursing Research**

Nurse researcher can encourage clinical nurse to apply the research findings in their daily nursing care activities and can bring out new innovative techniques used to promote comfort of the patient. Nurse researcher can promote research with regard to utilization of pharmacologic and non pharmacological agents to relieve pain in clinical practice.

Dissemination of the findings through conferences, professional journals will make the application of research findings to be effective. Nurse researcher should be motivated to conduct more studies to know the therapeutic effects of ice in reducing the discomfort of the patients.

## RECOMMENDATIONS

The study recommends the following for future research

1. The researcher has recommended the use of the intervention protocol during chest tube removal at Southern Railway Headquarters Hospital.
2. The researcher recommends the student nurses of Omayal Achi college of Nursing to follow the intervention protocol during chest tube removal .
3. To recommend the ICCR to make systematic review on the similar study.

Based on the study findings, the recommendations are,

1. The study can be conducted with a larger group in different setting for better generalisation.
2. The study can be conducted to assess the effectiveness of other non pharmacological intervention like music, guided imagery to reduce pain during chest tube removal.
3. A comparative study can be done to assess the effectiveness of ice application with other non pharmacological interventions.
4. Similar study can be conducted to find out the effectiveness of ice application during drainage tube removal after major abdominal surgeries.

## LIMITATIONS

1. The investigator faced difficulty in collecting the related literature as there were limited studies on the effectiveness of ice pack application in reduction of pain during chest tube removal.
2. The researcher was not able to maintain homogenousity for certain demographic variables due to limited sample size.

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# APPENDIX - C

## LETTER SEEKING EXPERT'S OPINION FOR CONTENT VALIDITY

From:

**Ms.ANSU MAMMEN**
M.Sc(N) II year,
Omayal Achi College of Nursing,
Puzhal, Chennai – 600 066.

To

Respected Madam / Sir,

**Sub:** Requisition for expert opinion on suggestion for content validity of the tool "Intervention Protocol during chest tube removal among postoperative cardiac clients".

This is to bring to your kind notice that I am a student studying M.Sc(Nursing) II year at Omayal Achi college of Nursing ,Puzhal, Chennai -66, affiliated to Dr.MGR.Medical University, Tamil Nadu.

I am planning to conduct **"A study to assess the effectiveness of ice pack application prior to chest tube removal on pain among post operative clients at selected setting, Chennai. "**

Herewith I am sending the

1. Intervention protocol during chest tube removal among postoperative cardio thoracic clients".
2. Combined Numeric Pain Rating Scale (Subjective) and Modified Comfort Scale (Objective) to assess the post test level of pain.

Kindly validate the tool and render your expert opinion in this regard. I am thankful to you for spending your valuable time for the validation of this tool. It will be very kind of you to return it to the undersigned at the earliest.

Thanking you,

Yours Sincerely,

**Ansu Mammen**

**Enclosures:**

1. Statement and objectives of the study.
2. Intervention protocol.
3. Combined Numeric Pain Rating Scale and Modified Comfort Scale
4. Validity Certificate

# LIST OF EXPERTS FOR CONTENT VALIDITY

## MEDICAL EXPERTS

1. **Dr. R. Jaganathan,**
   Senior Divisional Medical Officer.
   Dept of Cardio Thoracic Surgery
   Railway Hospital, Perambur,
   Chennai - 600-023.

2. **Dr. Samuel Sylvester,**
   Intensivist
   Frontier Lifeline Hospital,
   Chennai – 600 -101

## NURSING EXPERTS

3. **Mrs.K.V. Ashwathi**,
   Principal,
   St Thomas College of Nursing,
   Changanacherry,
   Kerala – 686 104.

4. **Mrs. J. Jaslina Gnanarani**,
   Reader, Apollo College of Nursing,
   Chennai - 600-095.

5. **Mrs. Shantham Sweet Rose,**
   Principal,
   Shakunthala College of Nursing,
   Trichy.

# APPENDIX – E

## INFORMED CONSENT

Good Morning,

I am **Ms. Ansu Mammen**, MSc (Nursing) II year student from Omayal Achi College of Nursing, Puzhal, Chennai. As a partial fulfillment of the programme, I am conducting "**A study to assess the effectiveness of ice pack application prior to chest tube removal on pain among post operative clients at selected setting, Chennai**."

I will be placing an icepack for 15 minutes around the chest tube insertion site before the chest tube removal. During the chest tube removal and after the chest tube removal, I will assess the level of pain using Subjective and Objective pain Rating scale. I kindly request you to extend your cooperation and willingness to participate in the study.

Thanking you.

# INFORMED CONSENT FORM

I understand that I am being asked to participate in a research study conducted by **Ms.ANSU MAMMEN,** M.Sc. (N) student of Omayal Achi College of Nursing. This research study will evaluate the **Effectiveness of ice pack application prior to chest tube removal on pain.** If I agree to participate in the study, I will be given the intervention (ice pack application) for 15 minutes. I understand that there are no risks associated with this study.

I understand that my pain level will be assessed along with my vital parameters **.** I realize that the knowledge gained from this study may help either me or other people in the future. I realize that my participation in this study is entirely voluntary, and I may withdraw from the study at any time I wish. If I decide to discontinue my participation in this study, I will continue to be treated in the usual and customary fashion.

I understand that all study data will be kept confidential. However, this information may be used in nursing publication or presentations. If I need to, I can contact **Ms.ANSU MAMMEN,** M.Sc. (N) student of Omayal Achi College of Nursing, puzhal, Chennai any time during the study.

The study has been explained to me by the researcher. I have read and understood this consent form, all of my questions have been answered, and I agree to participate in the study. I understand that I will be given a copy of this signed consent form.

---------- ----------

Signature of Participant Date:

---------- ----------

Signature of Investigator Date:

# APPENDIX – G

## RESEARCH TOOL

### PART –I DEMOGRAPHIC DATA

1. Age of the client in years

   a. 20 – 30

   b. 31- 40

   c. 41-50

   d. 51 – 60

   e. 60 & above.

2. Gender

   a. Male

   b. Female

3. Education

   a. Primary

   b. High school

   c. Higher Secondary

   d. Graduate & above.

4. Occupation

   a. Unemployed

   b. Skilled

   c. Unskilled

   d. Retired

5. Post operative diagnosis:

   a. Coronary Artery Bypass Graft.

   b. Valve replacement surgeries.

   c. Device closure.

6. Any previous surgeries

a .Minor if yes (specify)

b. Major if yes (specify}

c. Nil

**7.** Number of chest tubes

a. One

b. Two

c. Three

8. Removal of chest tubes

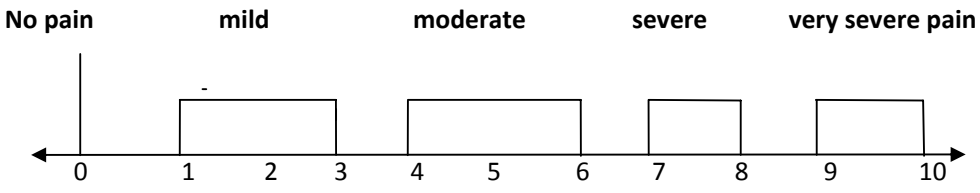
a. 24 -36 hours

b. 36 - 48 hours

# PART – II

## COMBINED NUMERIC PAIN RATING SCALE & MODIFIED COMFORT SCALE

### A. Numeric Pain Rating Scale (subjective)



**B. Modified Comfort Scale (Objective) adapted from National Institute of Health/Warren Grant Magnusen Clinical Center,July 2003.**

| CHARACTERSTICS | OBSERVED BEHAVIOURAL PATTERN | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| **1. CALMNESS** | **1**.CALM<br>**2**.SLIGHTLY ANXIOUS<br>**3**. ANXIOUS<br>**4**..VERY ANXIOUS<br>**5**.PANICKY | | | | | |
| **2. PHYSICAL MOVEMENT** | **1**.RELAXED<br>**2**.OCCASIONAL SLIGHT MOVEMENT<br>**3**.FREQUENT SLIGHT MOVEMENT<br>**4**. VIGOROUS MOVEMENT<br>**5**. VIGOROUS MOVEMENT OF THE TORSO & HEAD | | | | | |
| **3. BLOOD PRESSURE** | **1**.BP below BASELINE<br>**2**. BP CONSISTENTLY AT BASELINE<br>**3**.IN FREQUENTIAL OBSERVATION 15 % OR MORE , ABOVE BASE LINE ( 2 minute observation)<br>**4**.FREQUENT ELEVATION OF 15% OR MORE<br>**5**. SUSTAINED ELEVATION>15% | | | | | |
| **4.HEART RATE** | 1.HEART RATE Below BASELINE<br>2.CONSISTENTLY AT BASELINE<br>3.INFREQUENT ELEVATION OF 15% OR MORE<br>4.FREQUENT ELEVATION<br>5. SUSTAINED ELEVATION. | | | | | |

**INFERENCE**

| RANGE | INFERENCE |
|---|---|
| ≤10 | No pain |
| 11-15 | Mild pain |
| 16-20 | Moderate pain |
| 21-25 | Severe pain |
| 26-30 | Very severe pain |

Mean Arterial Blood Pressure monitored through Arterial Blood Pressure monitoring.

Heart Rate monitored through continuous cardiac monitoring.

# APPENDIX – I

## CODING FOR DEMOGRAPHIC VARIABLES

| Demographic Data | Code No. |
|---|---|
| **1. Age of the client in years** | |
| a.20 – 30 | 1 |
| b. 31- 40 | 2 |
| c. 41-50 | 3 |
| d.51 – 60 | 4 |
| e. 60 & above. | 5 |
| **2 . Gender** | |
| a .male | 1 |
| b. female | 2 |
| **3.Education** | |
| a. Primary | 1 |
| b. High school | 2 |
| c. Higher Secondary | 3 |
| d. Graduate & above. | 4 |
| **4. Occupation** | |
| a. Unemployed | 1 |
| b. Skilled | 2 |
| c. Unskilled | 3 |
| d. Retired | 4 |
| **5. Post operative diagnosis** | |
| a. Coronary Artery Bypass Graft | 1 |
| b. Valve replacement surgeries | 2 |
| c. Device closure. | 3 |

**6. Any previous surgeries:**

a. Minor if yes (specify) 1

b. Major if yes (specify) 2

c. Nil 3

**7. Number of chest tubes**

a. One 1

b. Two 2

c. Three 3

**8. Removal of chest tubes**

a. 24 -36 hours 1

b. 36 -48 hours 2

# APPENDIX – J

## BLUEPRINT

| S.No | Pain Scale | No .of. Items | Percentage |
|---|---|---|---|
| 1 | Numeric pain rating scale | 10 | 33.33 |
| 2 | Calmness | 5 | 16.67 |
| 3 | Physical movement | 5 | 16.67 |
| 4 | Blood pressure | 5 | 16.67 |
| 5 | Heart rate | 5 | 16.67 |
| | **Total** | **30** | **100%** |